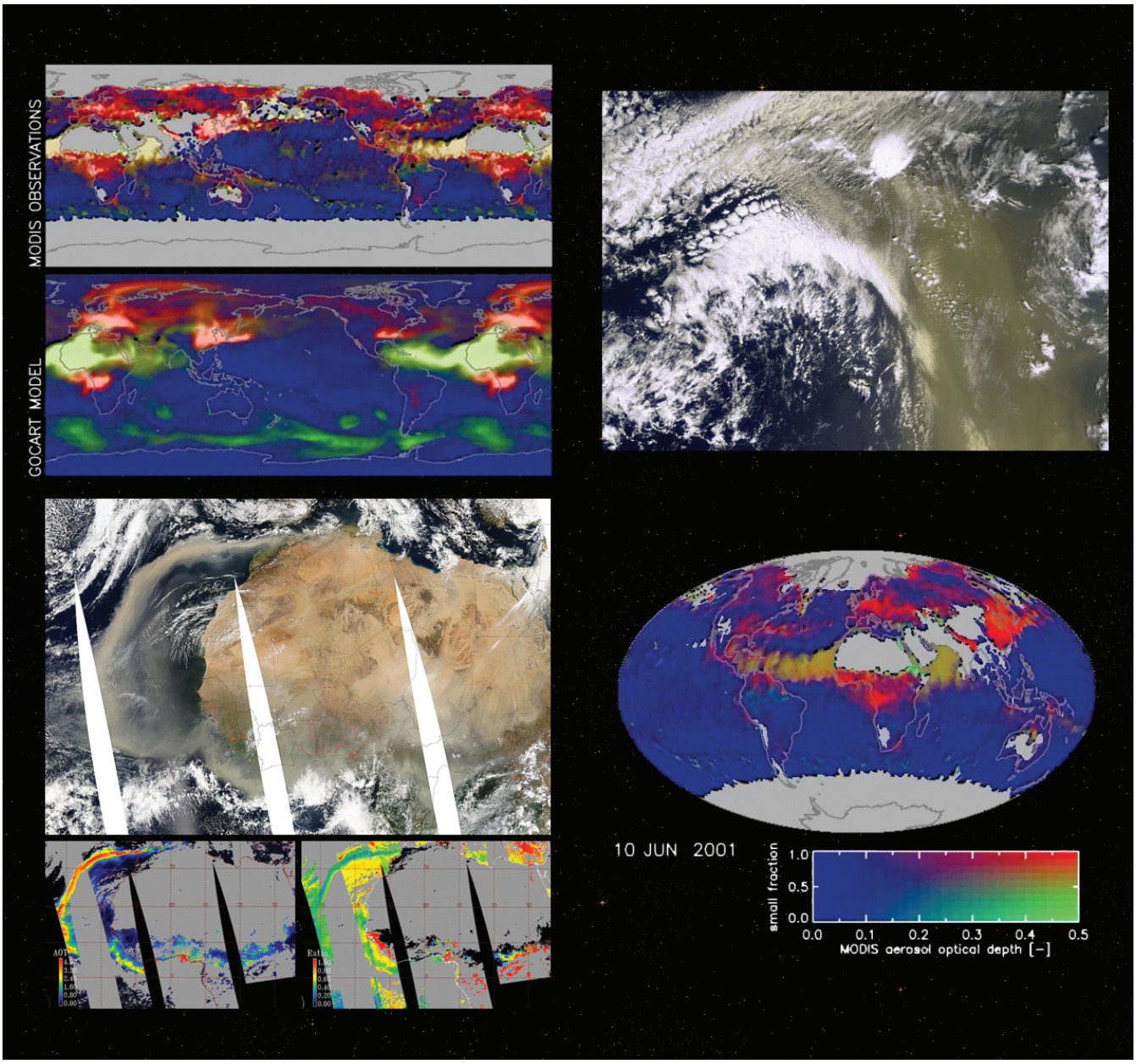
NASA/TM—2007–214150

Laboratory for Atmospheres

2006 Technical Highlights



April 2007

Cover Caption

Teams for the MISR and CERES instruments did not record data for a full minute on Sunday, June 4, 2006 as NASA's Terra and Aqua satellites flew over Goddard Space Flight Center in Greenbelt, MD. Likewise, the POLDER instrument aboard the French Space Agency's (CNES) PARASOL satellite and a global network of upward-looking sensors (called sun photometers) within NASA's Aerosol Robotic Network (AERONET) remained inactive during that same span. Each of these instruments observed a moment of data "silence" in honor of Dr. Yoram J. Kaufman. A pioneering climate researcher, Kaufman died on Wednesday, May 31, from injuries he received in a collision with a car while biking near the NASA Goddard campus on May 26.

The images showcased on our cover pay a respectful tribute to Yoram and the legacy he left behind for the Earth science community and mankind itself. These images are a small, yet powerful sample of his contributions and foci.

Yoram will be remembered as a brilliant scientist, a charismatic leader, and a positive influence within NASA. He collaborated with many scientists around the world in helping to advance our understanding of Earth's climate system. In the days before his untimely death, Yoram was not yet aware that he had been selected by the American Meteorological Society to receive its prestigious Verner E. Soumi Award, which is granted to one individual each year in recognition of highly significant technological achievement in the atmospheric (or related) sciences. We are deeply saddened to lose a valued friend, mentor and leader, and we are proud of Yoram's considerable accomplishments.

Cover Images

Top Left

The global aerosol system with the same color scheme as Image 3, but plotted on a different global projection. Blue colors denote low aerosol optical depth. Greenish tints and reddish tints of increasing intensity denote increasing aerosol optical depths of coarse mode and fine mode aerosols, respectively. The top panel is from aerosol retrievals derived from Terra-MODIS data, and the bottom panel from simulations of the GOddard Chemistry Aerosol Radiation and Transport (GOCART) Model.

Top Right

Satellite image acquired at 12:00 UTC (Universal Coordinated Time) on August 25, 2004 by the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor aboard the Earth Observing System (EOS) Terra satellite, and provided courtesy of the MODIS Rapid Response team. The image shows a huge yellowish-brown dust plume rising from the Sahara desert. The dust plume traverses parts of the Canary Islands, heading north. After approximately 1,000 km, it changes direction and heads west toward North America, but then, almost above the region of the Azores, something spectacular happens: the dust apparently begins to interact with clouds.

Bottom Left

A recirculating Saharan dust plume observed by MODIS from the Aqua satellite. True color composite (top panel), total aerosol optical thickness (bottom left panel), and fine mode optical thickness (bottom right panel)

These images of recirculating Saharan dust aerosol were retrieved by MODIS aboard Aqua, on March 6, 2004. Within the true color composite image (top panel), the dust is obviously sand colored, while clouds are white. By observing reflected sunlight in visible and longer wavelengths, MODIS is able to derive quantitative estimates of total aerosol optical thickness (a measure of aerosol concentration), and fine mode weighting (to differentiate between dust and other aerosol types). These quantities are represented by the two bottom panels. An optical thickness of 1.0 means that the aerosol obscures about two-thirds of the direct sunlight from reaching Earth's surface. A fine mode weighting less than 0.5 implies that dust is present. Areas in black are either masked by clouds, or are not observed by the satellite. Land or ocean surfaces too bright for aerosol detection (such as the desert or ocean sun glint) are shaded in gray. Due to the unique optical properties of dust aerosol (its brown color as shown in the top panel), MODIS is able to observe heavy dust over ocean sun glint. Here, the brown dust "finger" is quantitatively analyzed over the ocean sun glint.

Bottom Right

The global aerosol system derived from the data collected by MODIS aboard the Terra satellite. Coarse mode aerosols are generated by wind-driven processes and include sea salt and airborne desert dust. Fine mode aerosols are generated by combustion processes and include smoke and air pollution. The image is constructed from an eleven-day running average with a Gaussian weight centered on June 10, 2001. Gray regions indicate no retrievals in the eleven-day period.

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